Soc Psychiatry Psychiatr Epidemiol (2015) 50:1329–1346
DOI 10.1007/s00127-015-1084-4

REVIEW

A systematic review of mental disorders and perpetration of domestic violence among military populations

Kylee Trevillion[1] · Emma Williamson[2] · Gursimran Thandi[3] · Rohan Borschmann[4,5] · Sian Oram[1] · Louise M. Howard[1]

Received: 13 January 2015 / Accepted: 10 June 2015 / Published online: 14 July 2015

Abstract

Purpose Military populations may experience more severe forms of domestic violence than the general population. Although mental disorders are associated with domestic violence perpetration among the general population, it is not clear whether this is the case for military populations. This review aimed to establish the prevalence and odds of domestic violence perpetration among male and female military personnel with mental disorders.

Methods Systematic review: searches of eleven electronic databases were supplemented by hand searches, reference screening, citation tracking and expert recommendations.

Results Ten studies were included; nine reporting on partner violence and one on violence against an adult family member. Median prevalence estimates were calculated for partner violence perpetration among male military personnel with post-traumatic stress disorder (PTSD); estimates on other disorders were not possible due to lack of data. 27.5 % of men with PTSD reported past year physical violence perpetration against a partner and 91.0 % reported past year psychological violence perpetration against a partner. Due to limited data, no median estimates could be calculated for female military personnel. Data from individual papers indicate increased odds of past year partner violence perpetration among male and female military personnel with depression; inconsistent findings were reported for risk of partner violence perpetration among male and female military personnel with PTSD.

Electronic supplementary material The online version of this article (doi:10.1007/s00127-015-1084-4) contains supplementary material, which is available to authorized users.

✉ Kylee Trevillion
kylee.trevillion@kcl.ac.uk

Emma Williamson
e.williamson@bristol.ac.uk

Gursimran Thandi
gursimran.thandi@kcl.ac.uk

Rohan Borschmann
rohan.borschmann@unimelb.edu.au

Sian Oram
sian.oram@kcl.ac.uk

Louise M. Howard
louise.howard@kcl.ac.uk

[1] Section of Women's Mental Health, Health Service and Population Research Department, PO31 Institute of Psychiatry, Psychology and Neuroscience, King's College London, De Crespigny Park, London SE5 8AF, UK

[2] Centre for Gender and Violence Research, School for Policy Studies, University of Bristol, 8 Priory Road, Bristol BS8 1TZ, UK

[3] Academic Department of Military Mental Health, Institute of Psychiatry, Psychology and Neuroscience, King's College London, 10 Cutcombe Road, Denmark Hill, London SE5 9RJ, UK

[4] Centre for Mental Health, School of Population and Global Health, University of Melbourne, 207 Bouverie Street, Melbourne 3010, Australia

[5] Centre for Adolescent Health, Murdoch Children's Research Institute, Royal Children's Hospital, Parkville, Melbourne 3052, Australia

Conclusions There is some evidence that mental disorders among military personnel are associated with past year domestic violence perpetration, though current data cannot confirm direction of causality. Research is needed to inform the development of interventions targeted to reduce domestic violence perpetration among military personnel.

Keywords Military personnel · Mental disorders · Prevalence · Review

Introduction

Domestic violence is the use of threatening behaviour, violence or abuse against a current/former intimate partner or adult family member [1]. The intimate relationship between abuser and victim means that the violence is generally more frequent and severe than other forms of interpersonal abuse [2], and results in greater physical and psychiatric morbidities [3–5]. A significant public health issue, domestic violence is associated with increased health care use. Medical and mental healthcare costs exceed £1700 million per annum in the UK and $4 billion in the USA [6, 7].

Around one in four women and one in seven men in the general population experience some form domestic violence in their lifetime [8–10]. Little is known about the prevalence of domestic violence among military families [11], although initial evidence suggests that these families may experience more severe forms of violence compared to the general population [12]. Risk factors for domestic violence perpetration among military personnel, although limited, appear to be similar to the general population [13]. They include witnessing and experiencing abuse in childhood, previous violence victimization and perpetration, social deprivation and substance misuse [14]. Occupation-specific risk factors have also been identified [15–18], with evidence suggesting length of deployment as a risk factor for domestic violence perpetration [19]. Similarly, combat stress is shown to be associated with domestic violence perpetration among active-duty military personnel [20], military veterans [21] and prisoners of war [22]. Associations between combat stress and perpetration of domestic violence are, however, found to be partly mediated by the presence of posttraumatic stress disorder (PTSD) [20, 23]. These findings are noteworthy as evidence suggests around 15–20 % of military personnel report symptoms of PTSD, anxiety or depression following deployment [24]. The extent to which mental disorders across the diagnostic spectrum are associated with domestic violence perpetration in the military is not yet known.

People with mental disorders are found to be at a two to threefold increased risk of violence towards others [25]. The extent to which this increased risk is specifically associated with domestic violence perpetration remains unclear. A recent review identified a high prevalence and increased unadjusted odds for lifetime partner violence perpetration among both men and women in the general population [26]. It is not yet clear the extent to which these associations also exist among military populations.

Interest in domestic violence within the context of military families is particularly timely as there is increasing concern that due to the large numbers of military personnel returning to civilian life from active military service (e.g. from Afghanistan and previously Iraq), community-based statutory and voluntary welfare services may not have the expertise to cope with the increased demand for services from military personnel. From a policy perspective, although UK and USA guidance [27] recognises a need to address domestic violence perpetration in military families, the existing strategies concentrate on other forms of interpersonal violence. These policies also fail to consider whether the risks and mechanisms for domestic violence perpetration are different within military families. It is necessary, therefore, to examine the extent and correlates of domestic violence perpetration among military personnel in order to determine the level of need for relevant clinical interventions and whether existing treatments require tailoring to support the specific needs of military families. We, therefore, aimed to investigate the prevalence and odds of domestic violence perpetration among male and female military personnel with mental disorders.

Aims

The aim of this review was to systematically review the literature to estimate the prevalence and odds of domestic violence perpetration among male and female military personnel (active-duty or veteran) with a mental disorder (as measured by a validated diagnostic or screening instrument).

Methods

Search strategy

This review followed PRISMA reporting guidelines and the protocol is registered with PROSPERO: registration CRD42012002048 (http://www.crd.york.ac.uk/prospero) [28]. We undertook electronic searches of eleven bibliographic databases (see supplementary information), updated two systematic reviews on violence perpetration to identify studies which may have collected data on the perpetration of domestic violence [29, 30], hand searched five journals (*Aggression and Violent Behaviour, Journal*

of Family Violence, Journal of Interpersonal Violence, Journal of Traumatic Stress and Military Medicine), screened reference lists of included studies, conducted forwards citation tracking of included studies, and contacted experts for recommendations. Medical Subject Headings (MeSH) and text words were used for electronic database searches, from their dates of inception up to 31st January 2012. Terms for domestic violence were adapted from Cochrane protocols and literature reviews; [31–33] terms for mental disorders were adapted from NICE guidelines (see supplementary information) [34]. When updating the reviews on violence perpetration, we used the author's original search terms to search databases from February 2009 (the upper limit of the original review) to 31st January 2012 [29, 30]. We did not limit the searches further by including specific search terms for the military. Fifty experts were contacted with a list of included studies and were asked to nominate additional papers (either published or in press) that may have been eligible for inclusion in the review; responses were received from 29. Only English language papers were included.

An update of the above searches was carried out using the sources that identified all of the included articles from the initial search (i.e. MEDLINE, EMBASE and PsycInfo), from the upper date of the initial search (i.e. 31st January 2012) to 7th April 2014. This was supplemented by a hand search of a newly established military and health journal (Military Behavioral Health, first published in 2013) and screening of reference lists and forwards citation tracking of included studies.

Study selection criteria

Studies were eligible for inclusion if they: (a) included male and/or female active-duty or veteran[1]/ex-service personnel (aged ≥16 years); (b) measured mental disorders using a validated diagnostic (e.g. the Schedules for Clinical Assessment in Neuropsychiatry [36]) or screening instrument; (c) presented the results of peer-reviewed research based on intervention studies (e.g. randomised controlled trials, non-randomised controlled trials, parallel group studies), before-and-after studies, interrupted time series studies, cohort studies, case–control studies, or cross-sectional studies; and (d) reported the prevalence and/or risk of perpetration of domestic violence, or collected data from which these statistics could be calculated. Domestic violence was defined as "any incident of threatening behaviour, violence or abuse (psychological, physical, sexual, financial or emotional) between adults who are or have been intimate partners or family members regardless of gender or sexuality" [1]. Mental disorders included schizophrenia, schizotypal and delusional disorders, mood (affective) disorders and neurotic, stress-related and somatoform disorders.

Data extraction and quality appraisal

Three reviewers (KT, RB and GT) screened the downloaded titles and abstracts against the inclusion criteria; if it was unclear whether a reference met the inclusion criteria it was taken forward to the next stage of screening. Three reviewers (KT, RB and EW) then assessed the full-texts of potentially eligible studies. If studies collected data on the prevalence and/or risk of domestic violence perpetration but did not report it, study authors were contacted.

Data from included papers were extracted onto standardised electronic forms by three reviewers (KT, RB and GT). Extracted data included information on study design, sample characteristics, measures of mental disorder and domestic violence, and the prevalence and risk of domestic violence perpetration. Data were extracted separately for men and women, if presented.

The quality of included studies was independently appraised by two reviewers (KT and RB) using criteria adapted from validated tools [36–39]. Reviewers compared scores and resolved disagreements before allocating a final appraisal score. The quality appraisal checklist included items assessing study selection and measurement biases (see supplementary information). Studies were categorised as high-quality if they scored ≥50 % on questions pertaining to selection bias. Quality scoring, particularly for observational research, is contestable [40], yet we wanted to exclude poor studies that threatened the validity of the findings. This 50 % criterion was chosen in order to maximise the number of studies eligible for inclusion in any meta-analyses, whilst excluding studies in which a high risk of selection bias threatened the validity of the results.

Data analysis

Prevalence, odds ratios (ORs) and 95 % confidence intervals (CIs) were calculated for perpetration of domestic violence by type of mental disorder. Gender-disaggregated estimates were calculated where data were available. When calculating odds ratios, the control group were people with no mental disorders. Due to limited data, it was not possible to adjust odds ratios for potential confounders; unadjusted odds ratios are therefore presented. In addition,

[1] The term "veteran" does not have universal meaning and different countries have varying definitions for the term [35]. For the purposes of this review, we included all papers that defined their population as "veteran" and did not assign any further limiting criteria to this sample group.

due to a lack of gender-disaggregated and disorder-specific data from high-quality studies, we were unable to perform any meta-analyses.

Studies that presented data on the perpetration of verbal abuse were categorised under the heading 'psychological abuse', in keeping with the working definitions of this review.

Results

Key features

The study selection process is presented in Fig. 1. Literature searches yielded 10,987 unique references, of which 10,943 were excluded following title and abstract screening and a further 34 were excluded following full-text screening. The remaining ten papers were included in the review: seven were identified from searches of electronic databases, two from citation tracking and one from hand searching.

The ten studies reported on a combined sample of 34,939 men and 7736 women. All studies were conducted in high-income countries, with seven in the USA [15, 23, 41–45], one in Canada [46], one in Israel [47] and one in the UK [20]. Seven papers sampled only military veterans [15, 23, 41, 42, 44, 45, 47], two papers sampled only active-duty military personnel [43, 46] and one sampled both active-duty and ex-service personnel [20].

As shown in Table 1, six studies were conducted in military medical settings (i.e. US veteran affairs medical centres and an Israeli rehabilitation medical centre) and four in general military settings (i.e. US National Guard units, US Air Force, Canadian Regular Forces and UK Armed Forces communities). Six studies reported on past year violence only [15, 23, 41–43, 47], three on any violence perpetrated within a current relationship [44–46] and one on violence perpetrated in the weeks following return from deployment [48]. Six studies included both male and female military personnel and four included only men. Nine studies reported on partner violence perpetration and one on violence against an adult family member. Six of the ten studies used the validated questionnaire Conflict Tactics Scale to measure domestic violence, one study used an adapted version of the Conflict Tactics Scale and three studies developed their own measure. Five of the ten studies were categorised as high-quality (i.e. scoring 50 % or more for selection bias) [23, 43, 46, 47]. Full details of study design, sample size and outcomes are provided in Table 2.

Main findings

Results are reported for domestic violence perpetration by male and female military personnel with PTSD, depression, generalized anxiety disorder, and common mental disorder. Results are presented separately for past year perpetration of violence, violence perpetrated at any time within a current intimate relationship, and violence perpetrated in the weeks following return from deployment (see also Tables 2, 3).

Posttraumatic stress disorder (PTSD)

Past year physical partner violence perpetration Five papers reported on past year physical partner violence perpetration among military personnel with PTSD [15, 23, 41, 42, 47]. Among men with PTSD, the median prevalence of past year physical partner violence perpetration (four studies) was 27.5 % (IQR 21.8–36.2 %; range 21–46 %) [15, 23, 42, 47]. Due to a limited number of high-quality studies it was not possible to calculate a pooled odds ratio; among the two high-quality studies one found that men with PTSD were significantly more likely to perpetrate past year physical partner violence compared to men without a mental disorder (OR 2.64 95 % CI 1.14–6.07) [47] but the other did not find any statistically significant difference between men with PTSD and those without a mental disorder (OR 1.09 95 % CI 0.44–2.70) [23]. A mixed sample of 240 male and 24 female military veterans attending an outpatient mental health veteran affairs hospital clinic reported the prevalence of past year physical partner violence perpetration to be 18 % [41]. Only one study reported data separately for women and identified that one of the five female military personnel with PTSD and hazardous substance use behaviours, attending a US veteran affairs medical centre, reported past year physical partner violence perpetration [42].

Past year psychological partner violence perpetration Four papers reported on past year psychological partner violence perpetration among military personnel with PTSD [15, 23, 42, 47]. Among men with PTSD, the median prevalence of past year psychological partner violence perpetration (four studies) was 91.0 % (IQR 88.3–92.3 %; range 80–96 %) [15, 23, 42, 47]. Due to a limited number of high-quality studies it was not possible to calculate a pooled odds ratio; among the two high-quality studies one found that men with PTSD were significantly more likely to perpetrate past year psychological partner violence compared to men without a mental disorder (OR 3.65 95 % CI 1.45–9.19) [47] but the other did not find any statistically significant difference between men with PTSD and those without a mental disorder (OR 1.90 95 % CI 0.55–6.52) [23]. One study reported on past year psychological partner violence perpetration among female military personnel with PTSD and hazardous substance use behaviours; all five women surveyed in a US veteran

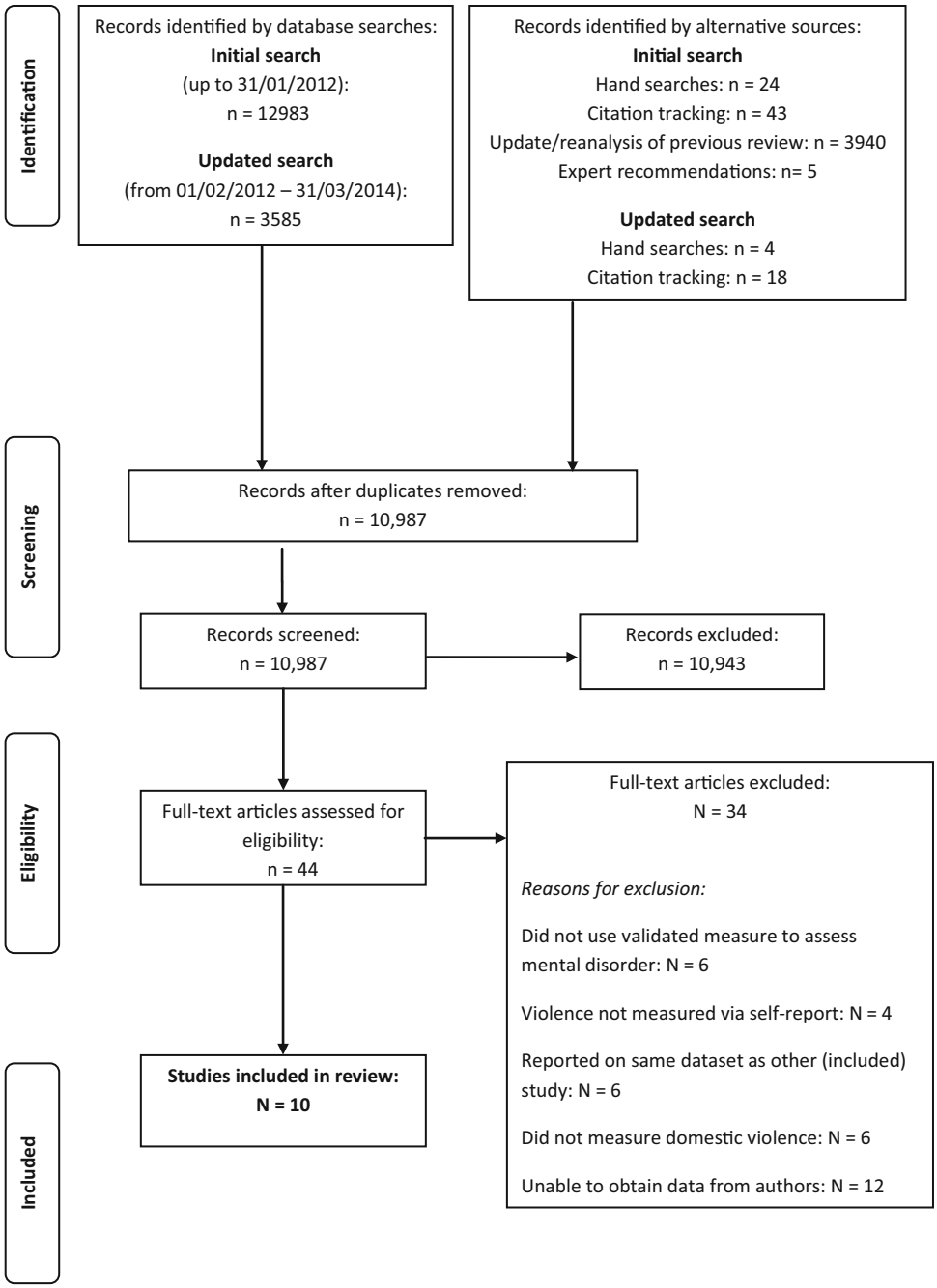

Fig. 1 Flow diagram of screened and included papers

affairs medical centre reported past year psychological violence perpetration [42].

Any partner violence perpetration within a current relationship Three studies reported on partner violence perpetration occurring at any time in a current relationship among military personnel with PTSD [44–46]. One paper reported on male and female physical partner violence perpetration only [45] and two reported male and/or female physical and psychological partner abuse perpetration [44, 46]. The one high-quality study sampled 1745 male and female Canadian Regular Forces personnel (24 % of whom were deployed within the previous 2 years) and reported a prevalence of any physical and/or sexual violence of 19 % and any emotional and/or financial violence of 33 % among men and women with PTSD [46]. This study found that men and women with PTSD were significantly more likely to have perpetrated physical and/or sexual violence (OR 3.35 95 % CI 2.00–5.59) and psychological and/or financial abuse (OR 2.79 95 % CI 1.84–4.23) in their current relationship compared to those without a mental disorder [46].

Table 1 Summary of key features of included studies ($n = 10$)

Gender	
Male only	4
Female only	0
Male and female	6
Setting	
Military medical setting	6
General military setting	4
Region	
North America	8
Europe	1
Middle East	1
Mental disorder[a]	
Posttraumatic stress disorder	9
Depression	5
Generalized anxiety disorder	1
Common mental disorder	1
Assessment of mental disorder[a]	
Posttraumatic stress disorder diagnostic interview schedule	2
Posttraumatic stress disorder screening instrument	7
Depression screening instrument	5
Generalized anxiety disorder screening instrument	1
Common mental disorder screening instrument	1
Type of domestic violence[a]	
Physical	9
Psychological	5
Mixed violence (physical, sexual, psychological and/or financial)	1
Assessment of domestic violence	
Validated instrument	6
Adaptation of validated instrument	1
Authors own measure	3

[a] As categories are not mutually exclusive, totals may exceed ten

Depression

Past year physical partner violence perpetration Three papers reported on past year physical partner violence perpetration among male and female military personnel with depression [41–43]; two of the three studies reported data separately for male and female personnel [42, 43]. Among men, a high-quality study comprising a national community survey of active-duty male US Air Force personnel (with a mean number of 8 weeks deployment) reported the prevalence of past year physical partner violence perpetration to be 3 % among those with depression [43]. This high-quality study found that men with depression were significantly more likely to perpetrate past year physical partner violence compared to men without a mental disorder (OR 3.95 95 % CI 3.05–5.11). A mixed sample of male and female military veterans attending an outpatient mental health veteran affairs hospital clinic reported the prevalence of past year physical partner violence perpetration to be 18 % [41]. One high-quality study reported data for female military personnel. A national community survey of active-duty US female Air Force personnel (with a mean number of 5 weeks deployment) reported the prevalence of past year physical partner violence perpetration to be 4 % among women with depression [43]. This study found that women with depression were significantly more likely to perpetrate past year physical partner violence compared to women without a mental disorder (OR 3.67 95 % CI 2.38–5.66) [43].

Past year psychological partner violence perpetration One paper reported on past year psychological partner violence perpetration among military personnel with depression. Among 125 male and 8 female US veterans (deployed a mean number of 1.5 times) attending a veteran affairs medical centre the prevalence of past year psychological partner violence perpetration was 77 % among depressed males and 60 % among depressed females [42].

Any partner violence perpetration within a current relationship Two papers reported on the prevalence of any partner violence perpetration within a current relationship among military personnel with depression [45, 46]. The one high-quality study of a mixed sample of 1745 male and female Canadian Regular Forces personnel (24 % of whom were deployed within the previous 2 years) reported a prevalence of any physical and/or sexual violence of 19 % and any emotional and/or financial violence of 32 % among men and women with depression [46]. This study found that men and women with depression were significantly more likely to have perpetrated physical and/or sexual violence (OR 3.86 95 % CI 2.34–6.35) and psychological and/or financial abuse (OR 3.00 95 % CI 2.00–4.50) in their current relationship compared to those without a mental disorder [46].

Generalized anxiety disorder (GAD)

One paper reported on the prevalence of any physical partner violence perpetration within a current relationship among military personnel with generalized anxiety disorder (GAD) [45]. Among 288 male and 24 female US veterans from Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) residing in 6 national guard units (the majority of whom experienced only one OEF/OIF deployment) the prevalence of any physical partner violence perpetration among men and women with GAD was 38 and 56 %, respectively [45].

Common mental disorder (CMD)

One high-quality paper reported on the prevalence of perpetration of physical violence against an adult family

Table 2 Characteristics of included studies—partner violence perpetration

References	Country	Sample size, type, and gender distribution	Method	Mental disorder	Prevalence of violence against a partner, with odds ratios	Quality appraisal score
Post-traumatic stress disorder (PTSD)						
Byrne and Riggs [15]	USA	50 male veterans accessing a department of veteran affairs medical centre	Cross-sectional survey of male combat veterans who served in Vietnam between 1964 and 1975 Self-reported past year physical violence and psychological abuse perpetrated against a partner assessed using the Conflict Tactics Scale PTSD symptoms were assessed using the PTSD Checklist-Military (PCL-M) (cut off score ≥50 assigned for probable PTSD)	With PTSD: 26/50 (52 %) Without PTSD: 24/50 (48 %)	Physical violence With PTSD: 12/26 (46 %) Without PTSD: 4/24 (17 %) OR 4.29 (1.14–16.07) $P = 0.0255$ Psychological abuse With PTSD: 25/26 (96 %) Without PTSD: 21/24 (88 %) OR 3.57 (0.35–36.94) $P = 0.2598$	Total score: 23/42 Selection score: 3/14 Measurement score: 10/14
Hundt et al. [41]	USA	240 male and 24 female veterans attending an outpatient mental health veteran affairs hospital clinic (data not disaggregated by gender)	Case-file review of mixed-era veterans presenting for outpatient mental health treatment at a veterans hospital clinic Past year physical violence against a partner was assessed using the hospital clinics routine intake question: "Have you pushed, grabbed, slapped, or punched your partner in the past year?" Authors scored respondents positive for physical violence if they answered "yes" to this questions. PTSD symptoms were assessed using the PTSD Checklist Civilian (PCL-C) version (cut off score ≥50 assigned for probable PTSD)	With PTSD: 184/264 (70 %) Without PTSD: 80/264 (30 %)	Physical violence With PTSD: 34/184 (18 %) Without PTSD: 9/80 (11 %) OR 1.79 (0.81–3.93) $P = 0.1438$	Total score: 27/42 Selection score: 5/14 Measurement score: 11/14

Table 2 continued

References	Country	Sample size, type, and gender distribution	Method	Mental disorder	Prevalence of violence against a partner, with odds ratios	Quality appraisal score
Owens et al. [42]	USA	125 male and 8 female veterans attending a veteran affairs medical centre	Cross sectional survey of male and female veterans seeking treatment in either the Posttraumatic Stress Program or Substance Use Disorders Program at a Veterans Affairs Medical Center Past year physical violence and psychological abuse against a current partner assessed using sub-scales of the Conflict Tactics Scale PTSD symptoms were assessed using the PTSD Checklist-Military (PCL-M) (cut off score $\geq$50 assigned for probable PTSD)	Males With PTSD and Hazardous substance use: 86/125 (69 %) Without PTSD or Hazardous substance use: 3/125 (2 %) Females With PTSD and Hazardous substance use: 5/8 (63 %) Without PTSD or Hazardous substance use: 0/8 (0 %)	Males Physical violence With PTSD and Hazardous substance use: 19/86 (22 %) Without PTSD or Hazardous substance use: 1/3 (33 %) OR 0.57 (0.05–6.60) $P = 0.6466$ Psychological abuse With PTSD and Hazardous substance use: 69/86 (80 %) Without PTSD or Hazardous substance use: 3/3 (100 %) OR 0.57 (0.03–11.50) $P = 0.3919$ Females Physical violence With PTSD and Hazardous substance use: 1/5 (20 %) Without PTSD or Hazardous substance use: 0/0 (0 %) [OR not applicable] Psychological abuse With PTSD and Hazardous substance use: 5/5 (100 %) Without PTSD or Hazardous substance use: 0/0 (0 %) [OR not applicable]	Total score: 26/42 Selection score: 4/14 Measurement score: 11/14

Table 2 continued

References	Country	Sample size, type, and gender distribution	Method	Mental disorder	Prevalence of violence against a partner, with odds ratios	Quality appraisal score
Solomon et al. [47]	Israel	202 male veterans who had previously sought treatment from rehabilitation medical centre	Cross sectional survey of male combat veterans who served in the 1973 Yom Kippur War Past year physical violence and psychological abuse perpetrated against a partner assessed using sub-scales of the Conflict Tactics Scale PTSD symptoms were assessed using the PTSD Inventory according to DSM-IV	With PTSD: 68/202 (34 %) Without PTSD: 134/202 (66 %)	Physical violence With PTSD: 14/68 (21 %) Without PTSD: 12/134 (9 %) OR 2.64 (1.14–6.07) $P = 0.0196$ Psychological abuse With PTSD: 62/68 (91 %) Without PTSD: 99/134 (74 %) OR 3.65 (1.45–9.19) $P = 0.0039$	Total score: 27/42 Selection score: 10/14 Measurement score: 8/14
Taft et al. [44]	USA	60 male veterans accessing a department of veteran affairs medical centre	Cross sectional survey of male combat veterans who served in Vietnam between 1964 and 1973 Physical violence and psychological abuse at any time against a current partner assessed using the Conflict Tactics Scale PTSD symptoms were assessed using the Clinician Administered PTSD Scale	With PTSD: 42/60 (70 %) Without PTSD: 16/60 (27 %)	Physical violence With PTSD: 13/42 (31 %) Without PTSD: 10/16 (63 %) OR 0.27 (0.08–0.90) $P = 0.0282$ Psychological abuse With PTSD: 35/42 (83 %) Without PTSD: 16/16 (100 %) OR 0.14 (0.01–2.66) $P = 0.0816$	Total score: 26/42 Selection score: 5/14 Measurement score: 10/14
Taft et al. [23]	USA	161 male veterans accessing a veteran affairs medical clinic	Cross sectional survey of male veterans attending a veteran healthcare service for PTSD between 2003 and 2008 Past year physical violence and psychological abuse against a partner assessed using the Conflict Tactics Scale-R PTSD symptoms were assessed using the Clinician Administered PTSD Scale	With PTSD: 126/161 (78 %) Without PTSD: 26/161 (16 %)	Physical violence With PTSD: 41/126 (33 %) Without PTSD: 8/26 (31 %) OR 1.09 (0.44–2.70) $P = 0.8604$ Psychological abuse With PTSD: 115/126 (91 %) Without PTSD: 22/26 (85 %) OR 1.90 (0.55–6.52) $P = 0.3003$	Total score: 31/42 Selection score: 8/14 Measurement score: 11/14

Table 2 continued

References	Country	Sample size, type, and gender distribution	Method	Mental disorder	Prevalence of violence against a partner, with odds ratios	Quality appraisal score
Waliski et al. [45]	USA	288 male and 24 female veterans from Operation Enduring Freedom/Operation Iraqi Freedom residing in 6 national guard units	Cross-sectional survey of veterans participating in a quasi-experimental evaluation of an acceptance and commitment therapy (ACT)-based educational workshop to promote healthy reintegration among returning Operation Enduring Freedom/Operation Iraqi Freedom troops Any physical violence perpetrated against a current partner was assessed using eight physical violence items from the Conflict Tactics Scale PTSD symptoms were assessed using the PTSD Checklist Civilian version (PCL-C) (cut off score ≥50 assigned for probable PTSD)	Males With PTSD: 38/288 (13 %) Without PTSD: 211/288 (73 %) Females With PTSD: 4/24 (17 %) Without PTSD: 13/24 (54 %)	Males With PTSD: 16/38 (42 %) Without PTSD: 34/211 (16 %) OR 3.79 (1.80–7.95) $P = 0.0002$ Females With PTSD: 2/4 (50 %) Without PTSD: 6/13 (46 %) OR 1.17 (0.12–10.99) $P = 0.8928$	Total score: 26/42 Selection score: 6/14 Measurement score: 11/14
Zamorski et al. [46]	USA	1745 active-duty Canadian Regular Forces Personnel (data not disaggregated by gender)	Cross-sectional survey of randomly selected sample of regular Canadian Armed Forces Personnel Self-reported partner violence perpetration over course of current relationship assessed using questions adapted from the Conflict Tactics Scale and its correlates were assessed in a stratified random sample PTSD symptoms were assessed using the 4 items primary care screen for PTSD with a cut off of 3 or more positive responses to the 4 items	With PTSD: 113/1741 (6 %) Without PTSD: 1628/1741 (94 %)	Physical+/or sexual violence With PTSD: 21/113 (19 %) Without PTSD: 104/1628 (6 %) OR 3.35 (2.00–5.59) $P \leq 0.0001$ Emotional/financial violence With PTSD: 37/113 (33 %) Without PTSD: 242/1628 (15 %) OR 2.79 (1.84–4.23) $P \leq 0.0001$	Total score: 35/42 Selection score: 13/14 Measurement score: 11/14

Table 2 continued

References	Country	Sample size, type, and gender distribution	Method	Mental disorder	Prevalence of violence against a partner, with odds ratios	Quality appraisal score
Depression						
Hundt et al. [41]	USA	240 male and 24 female veterans attending an outpatient mental health veteran affairs hospital clinic (data not disaggregated by gender)	Case-file review of mixed-era veterans presenting for outpatient mental health treatment at a veterans hospital clinic Past year physical violence against a partner was assessed using the hospital clinics routine intake question: "Have you pushed, grabbed, slapped, or punched your partner in the past year?" Authors scored respondents positive for physical violence if they answered "yes" to this questions Depression symptoms were assessed using the Beck Depression Inventory (cut off score ≥20 assigned for moderate depression)	With depression: 196/264 (74 %) Without depression: 68/264 (26 %)	With depression: 36/196 (18 %) Without depression: 7/68 (10 %) OR 1.96 (0.83–4.64) $P = 0.1203$	Total score: 27/42 Selection score: 5/14 Measurement score: 11/14
Owens et al. [42]	USA	125 male and 8 female veterans attending a veteran affairs medical centre	Cross sectional survey of male and female veterans seeking treatment in either the Posttraumatic Stress Program or Substance Use Disorders Program at a Veterans Affairs Medical Center Past year physical violence and psychological abuse against a current partner assessed using sub-scales of the Conflict Tactics Scale Depression symptoms were assessed using the Center for Epidemiological Studies–Depression Scale (CES-D) (cut off score ≥16 assigned for probable depression)	Males With depression: 100/125 (80 %) Without depression: 3/125 (2 %) Females With depression: 5/8 (63 %) Without depression: 0/8 (0 %)	Males Physical violence With depression: 19/100 (19 %) Without depression: 1/3 (33 %) OR 0.47 (0.04–5.45) $P = 0.5363$ Psychological abuse With depression: 77/100 (77 %) Without depression: 3/3 (100 %) OR 0.47 (0.02–9.45) $P = 0.3459$ Females Physical violence With depression: 1/5 (20 %) Without depression: 0/0 (0 %) [OR not applicable] Psychological abuse With depression: 3/5 (60 %) Without depression: 0/0 (0 %) [OR not applicable]	Total score: 26/42 Selection score: 4/14 Measurement score: 11/14

Table 2 continued

References	Country	Sample size, type, and gender distribution	Method	Mental disorder	Prevalence of violence against a partner, with odds ratios	Quality appraisal score
Slep et al. [43]	USA	35,391 male and female active-duty Air Force members: 28,758 males 6633 females	Cross sectional survey of active-duty Air Force members completing the 2006 Air Force Community Assessment, a biennial, anonymous survey conducted at 82 sites worldwide Past year physical violence against a partner assessed using a measure developed by the authors (constructs similar to the Revised Conflict Tactics Scale) Mental disorders assessed using the Centre for Epidemiological Studies Depression Scale (cut off score $\geq$16 assigned for probable depression)	Males With depression: 2348/28,758 (8 %) Without depression: 26,410/28,758 (92 %) Females With depression: 850/6633 (13 %) Without depression: 5783/6633 (87 %)	Males With depression: 79/2348 (3 %) Without depression: 231/26,410 (1 %) OR 3.95 (3.05–5.11) $P \leq 0.0001$ Females With depression: 32/850 (4 %) Without depression: 61/5783 (1 %) OR 3.67 (2.38–5.66) $P \leq 0.0001$	Total score: 30/42 Selection score: 9/14 Measurement score: 13/14
Waliski et al. [45]	USA	288 male and 24 female veterans from Operation Enduring Freedom/Operation Iraqi Freedom residing in 6 national guard units	Cross-sectional survey of veterans participating in a quasi-experimental evaluation of an acceptance and commitment therapy (ACT)-based educational workshop to promote healthy reintegration among returning Operation Enduring Freedom/Operation Iraqi Freedom troops Any physical violence perpetrated against a current partner was assessed using eight physical violence items from the Conflict Tactics Scale Depression was measured using the Patient Health Questionnaire (PHQ-9) (cut off score $\geq$10 assigned for probable depression)	Males With depression: 56/288 (19 %) Without depression: 194/288 (67 %) Females With depression: 6/24 (25 %) Without depression: 11/24 (46 %)	Males With depression: 21/56 (38 %) Without depression: 28/194 (14 %) OR 3.56 (1.81–6.97) $P = 0.0001$ Females With depression: 3/6 (50 %) Without depression: 5/11 (45 %) OR 1.20 (0.16–8.80) $P = 0.8576$	Total score: 26/42 Selection score: 6/14 Measurement score: 11/14

Table 2 continued

References	Country	Sample size, type, and gender distribution	Method	Mental disorder	Prevalence of violence against a partner, with odds ratios	Quality appraisal score
Zamorski et al. [46]	USA	1745 active-duty Canadian Regular Forces Personnel (data not disaggregated by gender)	Cross-sectional survey of randomly selected sample of regular Canadian Regular Forces Personnel Self-reported partner violence perpetration over course of current relationship assessed using questions adapted from the Conflict Tactics Scale and its correlates were assessed in a stratified random sample Depression measured using World Health Organization's Composite International Diagnostic Interview: short form (CIDI-SF)	With depression: 123/1688 (7 %) Without depression: 1565/1688 (93 %)	Physical+/or sexual violence: With depression: 23/123 (19 %) Without depression: 95/1688 (6 %) OR 3.86 (2.34–6.35) $P \leq 0.0001$ Emotional/financial violence With depression: 39/123 (32 %) Without depression: 226/1565 (14 %) OR 3.00 (2.00–4.50) $P \leq 0.0001$	Total score: 35/42 Selection score: 13/14 Measurement score: 11/14
Generalised anxiety disorder (GAD)						
Waliski et al. [45]	USA	288 male and 24 female veterans from Operation Enduring Freedom/Operation Iraqi Freedom residing in 6 national guard units	Cross-sectional survey of veterans participating in a quasi-experimental evaluation of an acceptance and commitment therapy (ACT)-based educational workshop to promote healthy reintegration among returning Operation Enduring Freedom/Operation Iraqi Freedom troops Any physical violence perpetrated against a current partner was assessed using eight physical violence items from the Conflict Tactics Scale Generalized anxiety disorder was measured using the generalized anxiety disorder scale (GAD-7) (cut off score $\geq$10 assigned for probable anxiety)	Males With GAD: 60/288 (21 %) Without GAD: 190/288 (7 %) Females With GAD: 9/24 (38 %) Without GAD: 8/24 (33 %)	Males With GAD: 23/60 (38 %) Without GAD: 26/190 (14 %) OR 3.92 (2.02–7.62) $P \leq 0.0001$ Females With GAD: 5/9 (56 %) Without GAD: 3/8 (38 %) OR 2.08 (0.30–14.55) $P = 0.4566$	Total score: 26/42 Selection score: 6/14 Measurement score: 11/14

PTSD post-traumatic stress disorder, *GAD* generalized anxiety disorder

Table 3 Characteristics of included studies—family violence perpetration

References	Country	Sample size, type, and gender distribution	Method	Mental disorder	Prevalence of violence against a partner, with odds ratios	Quality appraisal score
Post-traumatic stress disorder (PTSD)						
MacManus et al. [65]	UK	4038 male and 315 female regular deployed military personnel serving in March 2003	Cross-sectional survey of personnel serving in the UK armed forces in March 2003 Physical violence against an adult family member in the weeks following return from deployment was assessed using the authors own developed question: "I was physically violent towards a family member" PTSD symptoms were assessed using the PTSD Checklist Civilian version (PCL-C) (cut off score ≥50 assigned for probable PTSD)	Males With PTSD: 154/4038 (4 %) Without PTSD: 3844/4038 (95 %) Females With PTSD: 12/315 (4 %) Without PTSD: 302/315 (96 %)	Males With PTSD: 35/154 (23 %) Without PTSD: 139/3844 (4 %) OR 7.84 (5.19–11.85) $P \leq 0.0001$ Females With PTSD: 3/12 (25 %) Without PTSD: 4/302 (1 %) OR 24.83 (4.83–127.67) $P \leq 0.0001$	Total score: 37/42 Selection score:13/14 Measurement score: 13/14
Common mental disorder (CMD)						
MacManus et al. [65]	UK	4038 male and 315 female regular deployed military personnel serving in March 2003	Cross-sectional survey of personnel serving in the UK armed forces in March 2003 Physical violence against an adult family member in the weeks following return from deployment was assessed using the authors own developed question: "I was physically violent towards a family member" Common mental disorder was assessed using the General Health Questionnaire-12 (GHQ-12) (cut off score ≥4 assigned for probable CMD)	Males With CMD: 722/4038 (18 %) Without CMD: 3279/4038 (81 %) Females With CMD: 81/315 (26 %) Without CMD: 230/315 (73 %)	Males With CMD: 74/722 (10 %) Without CMD: 99/3279 (3 %) OR 3.29 (2.41-4.50) $P \leq 0.0001$ Females With CMD: 5/81 (6 %) Without CMD: 1/230 (0.4 %) OR 15.20 (1.75–132.12) $P = 0.0012$	Total score: 37/42 Selection score: 13/14 Measurement score: 13/14

PTSD post-traumatic stress disorder, *GAD* generalized anxiety disorder, *CMD* common mental disorder

member among military personnel with a common mental disorder (CMD). Among, 4038 male and 315 female regular deployed UK military personnel serving in March 2003 the prevalence of physical violence perpetration (against an adult family member) in the weeks following return from deployment was 10 % among men with CMD and 6 % among women with CMD [20]. This study found there was a significantly greater mean length of deployment among those reporting post-deployment violence (10.66 months) compared to those not reporting post-deployment violence (9.46 months) [20]. This study found a significantly increased likelihood of physical violence perpetration among men (OR 3.29 95 % CI 2.41–4.50) and women with CMD (OR 15.20 95 % CI 1.75–132.12) compared to men and women without a mental disorder [20] (see Table 3).

Discussion

The aim of this review was to estimate the prevalence and odds of domestic violence perpetration among male and female military personnel with a mental disorder. Four of the five high-quality papers reported a significantly higher

prevalence in those with mental disorders compared with those without, as is found in the general population [26]. Median prevalence estimates were calculated for partner violence perpetration among male military personnel with post-traumatic stress disorder (PTSD), estimates on other disorders were not possible due to lack of data. 27.5 % of male military personnel with PTSD report past year physical partner violence perpetration and 91.0 % report past year psychological partner violence perpetration. The higher prevalence of psychological versus physical abuse perpetration is consistent with wider research which finds that perpetrators may be more likely to admit to psychological than physical harm [49].

Prevalence estimates varied widely between the ten studies, reflecting high levels of study heterogeneity. Studies using clinical samples had particularly inconsistent results probably reflecting poorer methodological quality. Due to limited data, corresponding estimates could not be calculated for women's perpetration of violence. Pooled odds ratios could also not be calculated for either male or female military personnel due to a lack of high-quality studies. Individual studies suggested an increased odds of past year partner violence perpetration among male and female military personnel with depression. Findings were inconsistent in relation to partner violence perpetration among male and female military personnel with PTSD.

The most striking finding of this review is the limited number of studies in this area. Furthermore, several of the studies had major methodological limitations. Evidence is particularly limited on women in the military, as the higher-quality studies typically focused on male military personnel. More rigorous studies are needed that look at the full range of mental disorders and different forms of violence for both male and female military personnel, with specific consideration of occupation-specific factors that might impact on findings.

Rates of partner violence perpetration among military personnel are likely to be influenced by the military culture of using violence as a legitimate method of conflict resolution [50, 51]. In addition, a recent review has found that the number and length of deployments may be additional risk factors for partner violence perpetration [52].

Recent international military efforts to address domestic violence perpetration among military personnel include the US Department of Defence's 'Family Advocacy Program and Defence Task Force on Domestic Violence' and the Canadian Armed Forces 'Domestic Violence and Family Violence Prevention' programme [53, 54]. The UK government has also developed the Ministry of Defence's Tri-Force policy as part of their Violence Against Women and Girls strategy [27]. However, clear guidance and strategies on how military organisations can prevent and protect their personnel from domestic violence is lacking among these strategies. There is currently a dearth of evidence-based interventions on the prevention and management of domestic violence perpetration and to what extent interventions used in the general population are effective with military populations remains unclear [55].

Strengths and limitations

The major strengths of this review are that it included studies that assessed mental disorders using a diagnostic or screening measure and that it included reports of both physical and non-physical (e.g. psychological and sexual abuse) domestic violence perpetration.

Heterogeneity among the studies included in this review made it difficult to synthesise the findings. One example of heterogeneity can be found among the veteran samples surveyed in studies conducted in different countries, as the term "veteran" does not have a universal meaning and different countries have varying definitions for the term [35]. Variations in the definition of this term may present challenges for any future meta-analyses as the sample population may be too different to compare. The synthesis and interpretation of findings was also constrained by limitations in primary studies, measures of domestic violence and of mental disorder, and by a failure to control for potential confounders.

The measures used to assess domestic violence perpetration varied across studies and these inconsistencies reduced the comparability and reliability of study findings. Most studies used the Conflict Tactics Scale (CTS) but this measure has been criticised for its gender neutrality and for measuring acts out of context (i.e. not reporting whether acts of violence were in attack or defence) [56, 57], which may lead to differential misclassification bias across genders. Some papers developed their own measures without detailing whether, if at all, these measures were validated. Due to the limitations of the measures used, it was not possible to disentangle whether acts comprised a continued pattern of violence, intimidation and control that was severe and frequent in nature or acts that were infrequent, not associated with a general pattern of control, and arose as an intermittent response to occasional conflicts of everyday life [58, 59]. Measurement of domestic violence perpetration also varied with regards to time period. Although the majority of studies measured past year violence perpetration there were some that measured violence perpetrated at any time within a current relationship. The latter measurement time-frame means that there is potentially a wider and more varied timescale that is assessed, and one which could incorporate violence both in the previous year and prior to this. As a result, estimates of past year violence may be under-represented due to the inability to extrapolate this data from these studies. Studies also

varied in relation to the types of abuse measured (i.e. physical, sexual, psychological or a combination of behaviours). The majority of studies on military personnel concentrate on perpetration of physical violence and to a lesser extent psychological violence. A similar focus is found in research within the general population [26].

With regards to measurement of mental disorders, we included papers that used both validated diagnostic measures and screening instruments. The majority of papers used validated screening instruments and these measures are only able to identify the presence of probable mental disorder and not accurately diagnose a disorder. These factors are likely to reduce both the reliability and comparability of study findings. It was also not possible to assess if recovery from mental disorders was associated with a reduction in the risk of physical or psychological domestic violence perpetration.

Studies included in this review failed to control for confounders that could influence the association between mental disorders and domestic violence perpetration. One such factor is childhood adversity which is shown to be associated with symptoms of mental illness and partner violence perpetration among the general population [60–62], and PTSD, depressive symptoms and incidents of anger and aggression among military personnel [63, 64]. Evidence suggests childhood antisocial behaviour is also associated with outbursts of anger and perpetration of assault among military personnel [65, 66]. Research indicates that those deployed in combat-roles are more likely to report perpetrating physical violence upon return from theatre [48]. Not all studies adjusted for co-morbid alcohol or substance-abuse, which may also confound the association between mental disorders and domestic violence perpetration. Previous research within military populations has demonstrated an association between alcohol misuse and mental disorders and alcohol misuse and physical violence [48]. Therefore, the associations reported by individual studies between mental disorder and domestic violence perpetration may be confounded by these variables, as well as by military-specific variables such as length of deployment.

Finally, due to the study designs of the included papers, we are unable to draw conclusions about any direction of causality between mental disorder and the perpetration of domestic violence among male and female military personnel.

Implications

This review highlights the need for further research to assess the prevalence and risk of physical, sexual and psychological domestic violence perpetration among active-duty and veteran military personnel with mental disorders. There is also a need for congruency in the measurement of domestic violence in military populations. Future studies should account for the impact of factors such as childhood adversity, pre-enlistment antisocial behaviour, and comorbid alcohol and substance-abuse. Further work is required to develop interventions that are effective in reducing domestic violence perpetration among military personnel.

Acknowledgments This paper presents independent research funded by the NIHR under its Programme Grants for Applied Research scheme (RP-PG-0108-10084) and NHS England. LMH is also supported by an NIHR Research Professorship (NIHR-RP-R3-12-011). RB is supported by a McKenzie Postdoctoral Fellowship from the University of Melbourne. The views expressed in this publication are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health. The sponsor of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Conflict of interest All authors have no declarations of interest. Louise Howard is affiliated with the NIHR Specialist Biomedical Research Centre for Mental Health.

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